

REMARKS

Favorable reconsideration of this application is respectfully requested in view of the following remarks.

Claims 1, 7 and 8 remain withdrawn from consideration as being directed to the non-elected invention and the non-elected species. Claims 2-6 remain readable on the elected invention and the elected species. In addition, newly presented Claims 9-19 are readable on the elected invention and the elected species.

The only issue raised in the Official Action involves the rejection of Claims 2-6 on the basis of the disclosure contained in U.S. Patent No. 3,412,628 to *De Gain*. In the claimed vehicle bumper defined in Claim 2, the hollow crash box which is coupled to the bumper reinforce as well as the vehicle body includes a previously formed initial buckling portion so that plastic deformation of the crash box due to axial load starts at the initial buckling portion. To more clearly highlight differences between the claimed vehicle bumper here and the structural member described in *De Gain*, Claim 2 has been amended to recite that the plastic deformation of the crash box associated with application of an axial load starts at the initial buckling portion (located close to one of the crash box ends) and then progresses towards the other one of the first and second ends of the crash box from the initial buckling portion so that part of the crash box having no initial buckling portion is gradually deformed. This construction allows a relatively significant amount of impact energy to be absorbed. In addition, plastic deformation of the crash box is controlled and well defined in that during the first or initial stages of collision, significant bending of the

part of the crash box having no initial buckling portion does not occur. This construction also allows the crash box to reliably absorb shock.

The shock absorbing structural member 10 disclosed in *De Gain* has cylindrical end portions 14, 16 and a plurality of outwardly bulging accordion-like portions 22 positioned between the cylindrical end portions 14, 16. These outwardly bulging accordion-like portions 22 extend over virtually the entire longitudinal extent of the structural member 10. Each of the accordion-like portions 22 is bordered by annular peripherally depressed grooves 24. In addition, each of the accordion-like portions 22 includes a plurality of axially extending slits 26 so that bracket-like elements 28 are defined between adjacent pairs of slits.

The construction of the structural member described in *De Gain* is not well suited to absorbing a significant amount of impact energy. Also, during at least the initial stages of collision, the structural member 10 may bend. Further, considering that the accordion-like portions 22 extend virtually the entire length of the structural member, the point at which deformation of the structural member begins when a load is applied is quite unpredictable. Indeed, the initial deformation may occur at any one of the accordion-like portions 22 along the length of the structural member, or possibly at all of the accordion-like portions 22.

Thus, the claimed vehicle bumper defined in Claim 2 is significantly different from that disclosed in *De Gain*. Accordingly, withdrawal of the rejection of record and allowance of this application are earnestly solicited.

New independent Claim 12 defines that the initial buckling portion is located closer to one end of the hollow crash box than the other, with the start of plastic deformation of the hollow crash box occurring at a specific portion of the hollow crash box defined by the initial buckling portion and proceeding toward an adjacent portion of the hollow crash box. This differs from the structural member 10 disclosed in *De Gain* because, as noted above, the accordion-like portions 22 extend virtually the entire length of the structural member and thus are not located closer to one end than the other and further because deformation of the disclosed structural member can start anywhere along the length of the structural member rather than at a specific location defined by an initial buckling portion that is located closer to one end than the other. It is thus submitted that new independent Claim 12 is also patentably distinguishable over the disclosure contained in *De Gain*.

The dependent claims are allowable at least by virtue of their dependence from allowable independent claims. In addition, these dependent claims define further distinguishing characteristics associated with the claimed vehicle bumper. For example, Claim 4 defines that the initial buckling portion is close to the first end of the crash box (i.e., the end coupled to the bumper reinforce). Thus, when an axial load is applied to the crash box such as during a collision, plastic deformation of the crash box proceeds from the initial buckling portion toward the vehicle body, with the part of the crash box closer to

the vehicle body at latter stages of shock absorption by the plastic deformation. Thus, the part of the crash box close to the vehicle body does not receive relatively great loads in the initial stages of the collision as discussed on page nine of the present application.

New dependent Claim 9 defines that the crash box has sides and axially extending ridgelines defined by adjacent pairs of sides of the crash box, with the initial buckling portion extending along the entire circumference of the crash portion over a predetermined axially extending portion of the crash box so that the initial buckling portion is formed not only on the sides of the crash box but also on the ridgelines. Further, Claim 9 defines that the initial buckling portion includes projections and recesses which are smoothly connected to the part of the crash box having no initial buckling portion. Also, Claim 10 defines the substantially rectangular cross-section of the crash box. A crash box provided with ridgelines or a rectangular cross-section as set forth in Claims 9 and 10 is relatively rigid so that in the initial stages of the collision, the crash box is generally not bent. This allows the crash box to relatively reliably absorb shock.

New dependent Claims 11 and 19 define that the initial buckling portion is a plastically deformed portion of the crash box, and Claim 11 further recites that this plastic deformation occurs by applying an axial load to the crash box material. As discussed in the application, this construction does not require a special die to form the crash box with the initial buckling portion and so productivity is improved and costs are reduced.

New dependent Claim 16 defines that the initial buckling portion is devoid of holes such as discussed near the bottom of page eight of the application.

New Claim 17 defines the interior of the hollow crash box being divided into a plurality of sections by at least one partition, and new dependent Claim 18 defines that the hollow crash box has a plurality of corners, with the initial buckling portion extending across each corner.

All of these claims define features which further distinguish the claimed vehicle bumper.

In light of the foregoing, it is submitted that all of the claims currently at issue in this application are allowable. Accordingly, withdrawal of the rejection of record and allowance of this application are earnestly solicited.

Should any questions arise in connection with this application or should the Examiner believe that a telephone conference with the undersigned would be helpful in resolving any remaining issues pertaining to this application, the undersigned respectfully requests that he be contacted at the number indicated below.

Respectfully submitted,

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Mark-up of Claim 2

2. (Amended) A vehicle bumper comprising:

a bumper reinforce;

a hollow crash box, which extends from the bumper reinforce, wherein the crash box has a first end, which is coupled to the bumper reinforce, and a second end, which is coupled to the vehicle body, and wherein, when receiving axial load, the crash box is plastically deformed to absorb the axial load; and

an initial buckling portion, which is previously formed in the crash box close to one of the first and second ends, wherein plastic deformation of the crash box due to axial load starts at the initial buckling portion and progresses toward the other one of the first and second ends from the initial buckling portion so that part of the crash box having no initial buckling portion is gradually deformed.